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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/812,947	03/31/2004	Seikoh Yoshida	257079US8	4922

22850 7590 04/04/2007
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

LEWIS, MONICA

ART UNIT	PAPER NUMBER
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2822

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	04/04/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 04/04/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/812,947

Applicant(s)

YOSHIDA, SEIKOH

Examiner

Monica Lewis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 January 2007.
- 2a) ☒ This action is **FINAL**: 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 January 2007 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. This office action is in response to the amendment filed January 8, 2007.

Drawings

2. The drawings are objected to because "Related Art" should be "Prior Art" (See Figure 3). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 1-3 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moku et al. (Japanese Publication No. 2003-059948-Translation) in view of Applicant's Prior Art.

In regards to claim 1, Moku et al. ("Moku") discloses the following:

- a) a substrate (1) (For Example: Figure 1);
- b) a semiconductor layer structure including a buffer layer (2) structure, a channel layer (10) that are consecutively formed in this order on said substrate;
- c) buffer layer structure includes at least one first buffer layer (9) comprising as a main component thereof a compound semiconductor expressed by the general formula of $\text{Al}_x\text{In}_y\text{Ga}_{1-x-y}\text{As}_u\text{P}_v\text{N}_{1-u-v}$ (where $0 \leq x \leq 1$, $0 \leq y \leq 1$, $x+y \leq 1$, $0 \leq u < 1$, $0 \leq v < 1$, $u+v < 1$); and at least one second buffer layer (8) comprising as a main component thereof a compound semiconductor expressed by the general formula of $\text{Al}_a\text{In}_b\text{Ga}_{1-a-b}\text{As}_c\text{P}_d\text{N}_{1-c-d}$ (where $0 \leq a \leq 1$, $0 \leq b \leq 1$, $a+b \leq 1$, $0 \leq c < 1$, $0 \leq d < 1$, $c+d < 1$) and wherein said first buffer layer and said second buffer layer have different bandgap energies, and have two-dimensional electron gas density or densities therein not greater than $5 \times 10^{12} \text{cm}^{-2}$ (Note: For Example: See Page 5 of 10 Paragraphs 16-18)(Note: Although Moku fails to specifically disclose that the first buffer layer and said second buffer layer have different bandgap energies, and that the two buffer layers have two-dimensional electron gas density or densities therein not greater than $5 \times 10^{12} \text{cm}^{-2}$, the same material is utilized in Moku as in Applicant's invention therefore it would have the same characteristics).

In regards to claim 1, Moku fails to disclose the following:

- a) a donor layer.

However, Applicant's Prior Art discloses a donor layer (15) (For Example: See Figure 3). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Moku to include a donor layer as disclosed in Applicant's Prior Art because it aids in the formation of a lateral FET (For Example: See Column 2 Lines 14-23).

Additionally, since Moku and Applicant's Prior Art are both from the same field of endeavor, the purpose disclosed by Applicant's Prior Art would have been recognized in the pertinent art of Moku.

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In regards to claims 2 and 7, Moku discloses the following:

a) the first buffer layer has a thickness of not less than .5nm and not greater than 20nm, and said second buffer layer has a thickness of not less than .5nm and not greater than 20nm (For Example: See Page 2 of 10 Paragraph 9)(Note: In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. See MPEP § 2144.05.).

In regards to claims 3 and 8, Moku discloses the following:

a) the second buffer layer has bandgap energy greater than a bandgap energy of said first buffer and has an Al composition not less than a thickness of not less than .5 and a thickness not less than 1 nm and nor greater than 10nm (For Example: See Page 2 of 10 Paragraph 9, Page 2 of 5 Paragraph 35, Page 8 of 10 Paragraph 34)(Note: In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. See MPEP § 2144.05.).

In regards to claim 6, Moku discloses the following:

a) buffer layer structure includes a plurality of said first buffer layers and a plurality of second buffer layers which are alternately laid on one another (For Example: See Figure 1).

Allowable Subject Matter

5. Claims 4, 5, 9 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

6. Applicant's arguments filed 1/8/07 have been fully considered but they are not persuasive. Applicant argues that "the occurrence of leakage current caused by the two-dimensional electron gas in the buffer layers was not known in the art at the time of the present invention, and was thus unexpected prior to the present invention...the present inventor found as illustrated in the graph above the density of the two-dimensional electron gas abruptly increases

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if the thickness of both the first and second buffer layers exceeds 20 nm and conceived that first and second buffer layers of a thickness not greater than 20 nm suppress the density of the two-dimensional gas...and thereby reduce the leakage current...Moku et al. describe a buffer layer structure including first and second layers, similar to the present invention. However, Moku is silent to the fact that the layered buffer structure causes the occurrence of the two-dimensional gas in the buffer layers, that the two-dimensional electron gas in the buffer layers increases the leakage current, and that the increase or decrease of the density of the two-dimensional gas as well as the leakage current depends on the thickness of the of the buffer layers configuring the heterojunction interface...Moku et al do not show the claimed configuration (Claim 2) of the present invention in which both the first and second layers have a thickness not greater than 20 nm at the same time.” However, as previously stated in a case where the claimed ranges overlap or lie inside ranges disclosed by the prior art a prima facie case of obviousness exists. See MPEP § 2144.05. Moku discloses the following: a) the first buffer layer has a thickness of not less than .5nm and not greater than 20nm, and said second buffer layer has a thickness of not less than .5nm and not greater than 20nm (For Example: See Page 2 of 10 Paragraph 9) Finally, where the claimed and prior art products are identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness, has been established...when the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not...Therefore, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. See MPEP § 2112.02. Therefore, since Moku does not specifically disclose

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the limitations listed above, the same material is utilized in Moku as in Applicant's invention therefore it would inherently have the same characteristics.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 571-272-1838. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for the organization

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where this application or proceeding is assigned is 571-273-8300 for regular and after final communications.

ML

March 26, 2007

A handwritten signature in black ink, appearing to read 'ML', with a long, sweeping horizontal line extending to the right.

MONICA LEWIS
PRIMARY PATENT EXAMINER